

NAME:

DATE:

## Unit-2 Mastery Assessment (version 604)

### Question 1 (10 points)

Let  $f$  represent a function. If  $f[5] = 24$ , then there exists a knowable solution to the equation below.

$$y = \frac{f\left[\frac{x-11}{7}\right] + 15}{13}$$

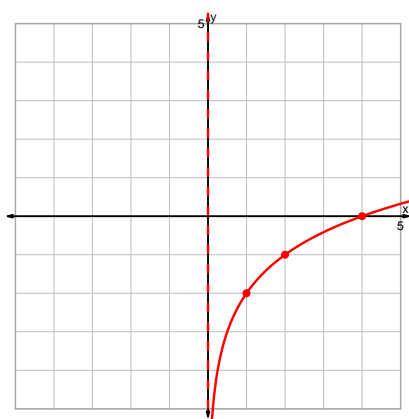
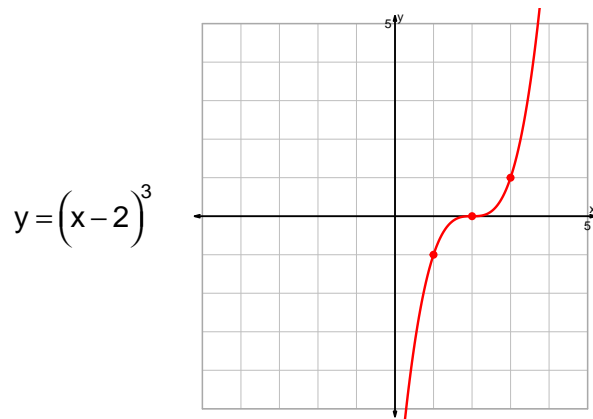
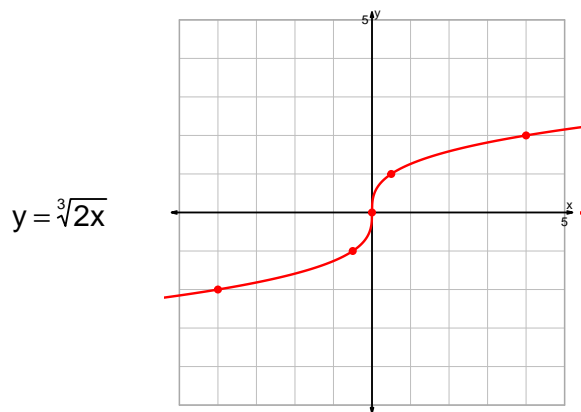
Find the solution.

$$x = 46$$

$$y = 3$$

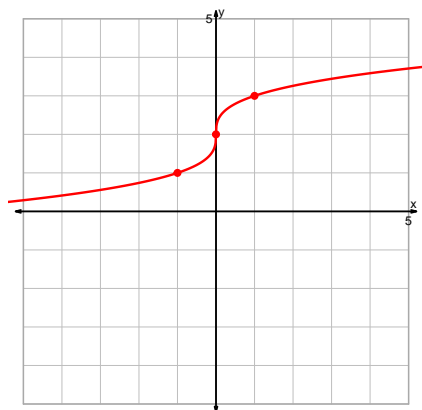
### Question 2 (20 points)

Graph the equations accurately. For each integer-integer point on the parent, indicate the corresponding point precisely. Also, with dashed lines, indicate any asymptotes.

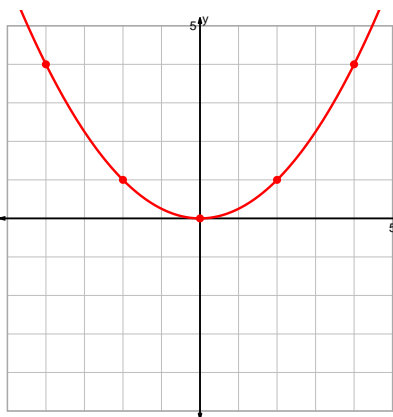


Question 2 continued...

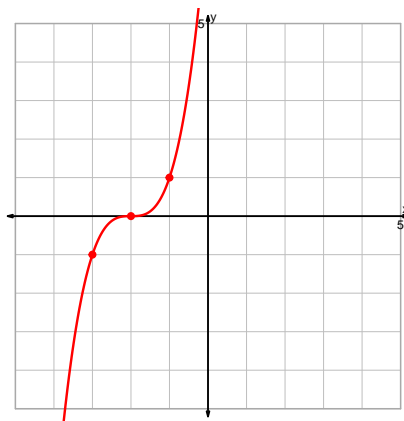
$$y = \sqrt[3]{x} + 2$$



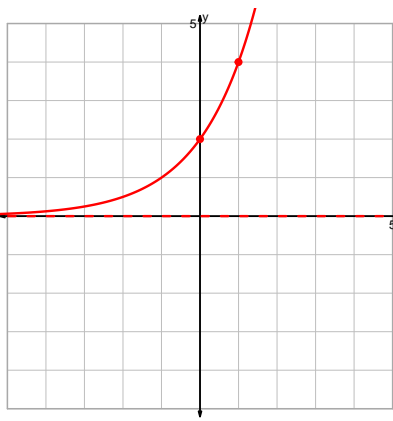
$$y = \left(\frac{x}{2}\right)^2$$



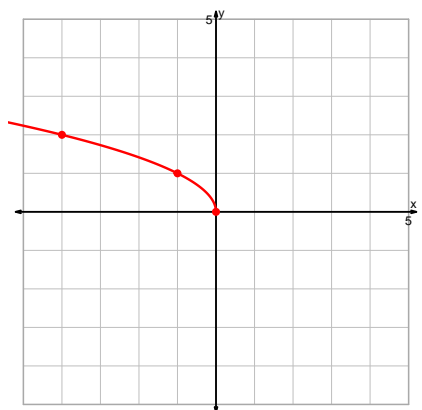
$$y = (x + 2)^3$$



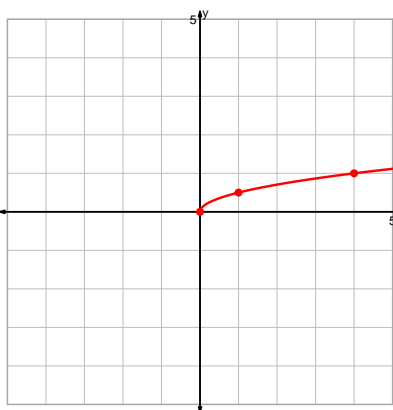
$$y = 2 \cdot 2^x$$



$$y = \sqrt{-x}$$

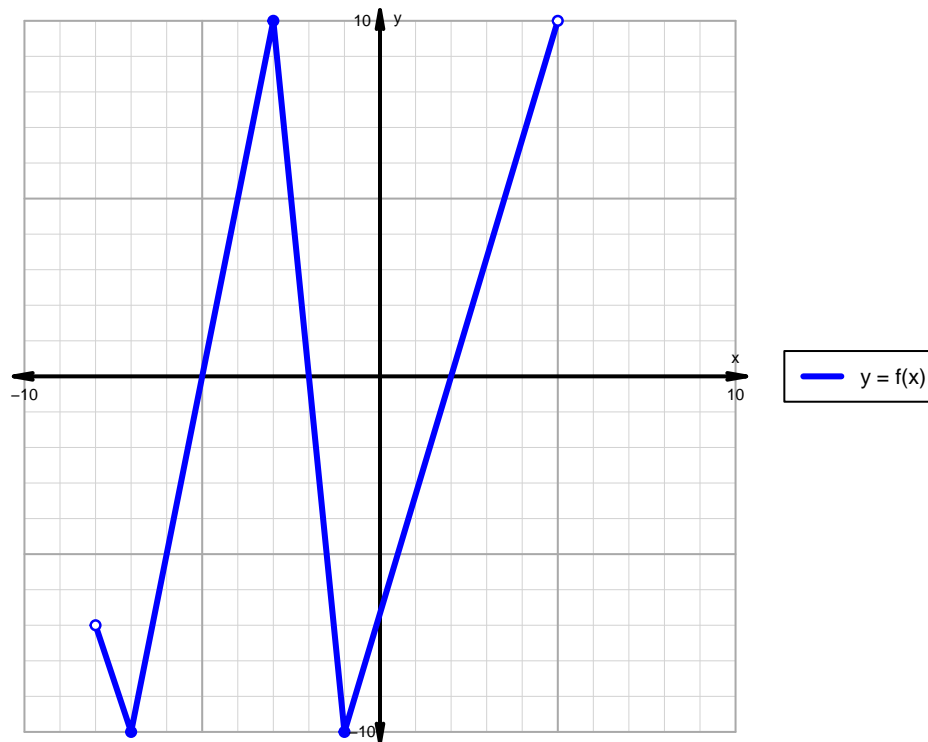


$$y = \frac{\sqrt{x}}{2}$$



### Question 3 (20 points)

A function is graphed below.



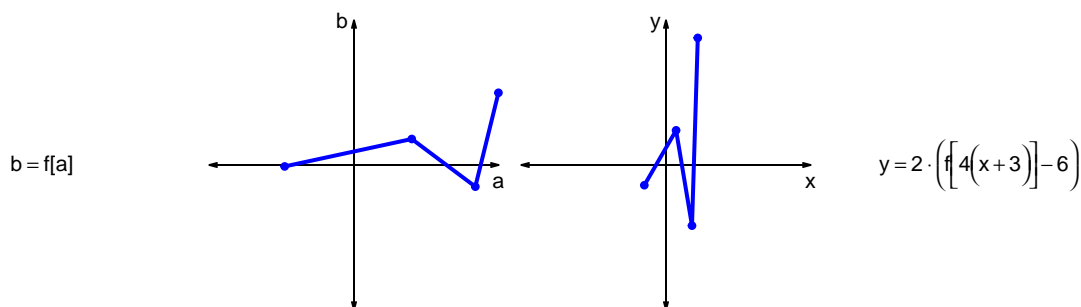
Indicate the following intervals using interval notation.

Feature	Where
Positive	$(-5, -2) \cup (2, 5)$
Negative	$(-8, -5) \cup (-2, 2)$
Increasing	$(-7, -3) \cup (-1, 5)$
Decreasing	$(-8, -7) \cup (-3, -1)$
Domain	$(-8, 5)$
Range	$(-10, 10)$

**Question 4 (20 points)**

Let  $f$  represent a function. The curves  $b = f[a]$  and  $y = 2 \cdot (f[4(x+3)] - 6)$  are represented below in a table and on graphs.

a	b	x	y
-48	-1	-15	-14
40	18	7	24
84	-15	18	-42
100	50	22	88



- a. Write formulas for calculating  $x$  from  $a$  and calculating  $y$  from  $b$ . (Or, write the coordinate transformation formula.)

$$x = \frac{a}{4} - 3$$

$$y = 2(b - 6)$$

Or, you can write the formulas as a coordinate transformation:

$$(a, b) \rightarrow \left( \frac{a}{4} - 3, 2(b - 6) \right)$$

- b. What geometric transformations (using words like translation, stretch, and shrink), and in what order, would transform the first curve  $y = f[x]$  into the second curve  $y = 2 \cdot (f[4(x+3)] - 6)$ ?

1. Horizontal shrink by factor 4.
2. Translate left by distance 3.
3. Translate down by distance 6.
4. Vertical stretch by factor 2.

Or, technically, the vertical transformations could come first.

1. Translate down by distance 6.
2. Vertical stretch by factor 2.
3. Horizontal shrink by factor 4.
4. Translate left by distance 3.

**Question 5 (10 points)**

A parent square-root function is transformed in the following ways:

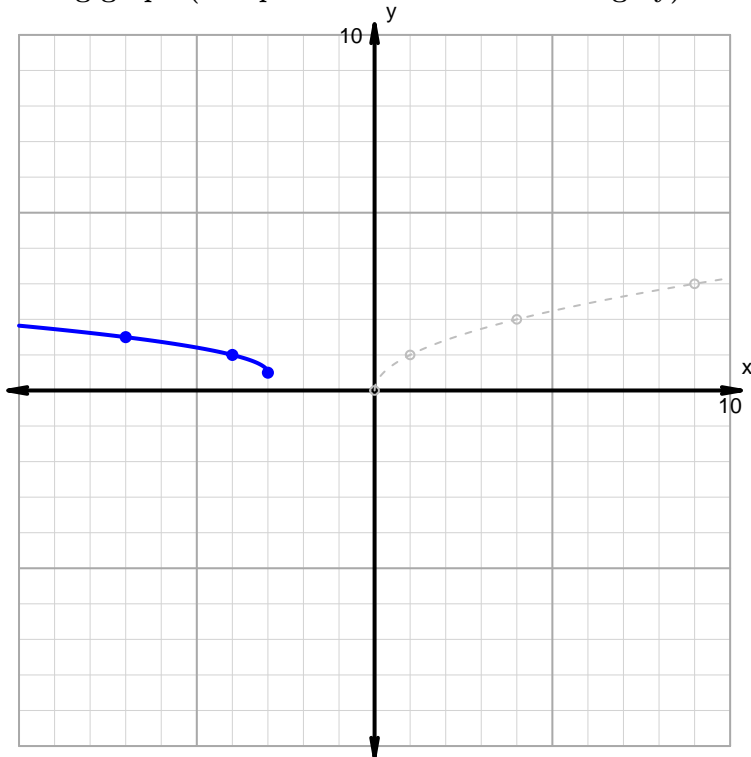
**Horizontal transformations**

1. Translate right by distance 3.
2. Horizontal reflection over  $y$  axis.

**Vertical transformations**

1. Translate up by distance 1.
2. Vertical shrink by factor 2.

**Resulting graph (and parent function in dashed grey):**



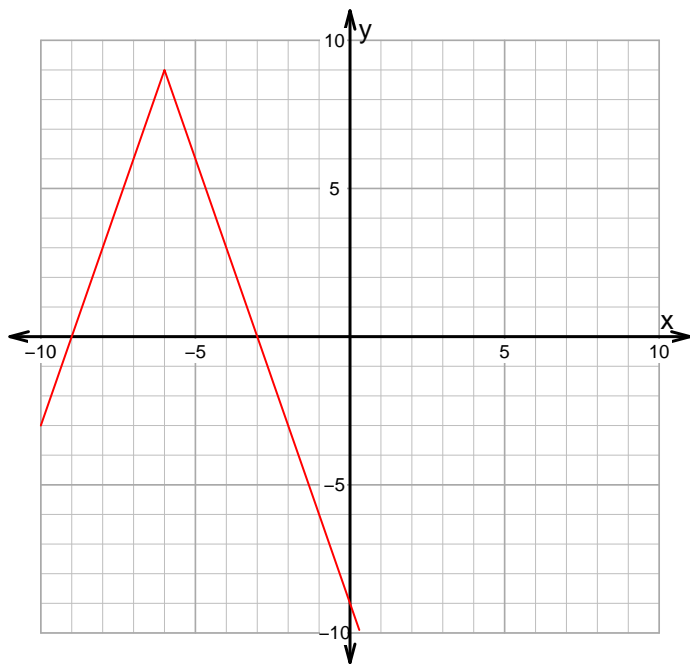
- What is the equation for the curve shown above?

$$y = \frac{\sqrt{-x-3}+1}{2}$$

**Question 6 (20 points)**

Make an accurate graph, and describe locations of features.

$$y = -3 \cdot |x + 6| + 9$$



Feature	Where
Domain	$(-\infty, \infty)$
Range	$(-\infty, 9]$
Positive	$(-9, -3)$
Negative	$(-\infty, -9) \cup (-3, \infty)$
Increasing	$(-\infty, -6)$
Decreasing	$(-6, \infty)$